

Consider

1

$$S \rightarrow \underline{b}A\underline{b} \mid \underline{b}B\underline{a}$$

$$A \rightarrow as \mid cB$$

$$B \rightarrow b \mid Bc$$

$$C \rightarrow cC$$

a) Give two reasons why this grammar is not LL(1)?

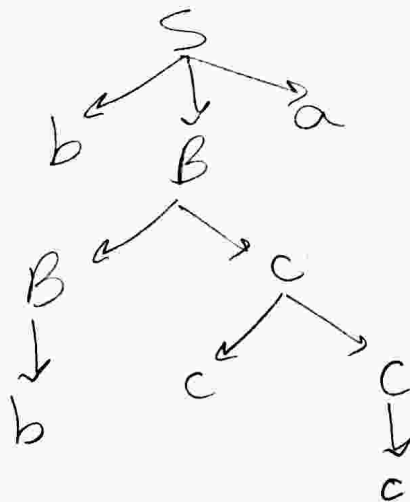
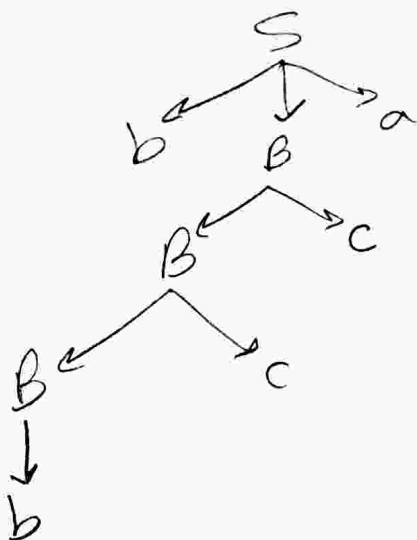
1) ambiguous

2) left recursive (B)

3) not left factored $S \rightarrow \underline{b}A\underline{b} \mid \underline{b}B\underline{a}$

لأنه في كل حالة لا بد أن $S \rightarrow bAb$ أو $S \rightarrow bBa$ فليس هناك أي شيء مشترك.

bbcea



b) rewrite it including few non-terminals as possible, so that it is LI(1)

$$\begin{aligned} S &\rightarrow bT \quad \# \\ T &\rightarrow Ab|Ba \\ A &\rightarrow as|cB \\ B &\rightarrow bD \\ C &\rightarrow cD \\ D &\rightarrow \epsilon|cD \end{aligned}$$

c) Construct first and follow sets for each non-terminal in rewritten grammar.

	First	Follow
S	$\{b\}$	$\{\#, b\}$
T	$\{a, c, b\}$	$\{\#, b\}$
A	$\{a, c\}$	$\{b\}$
B	$\{b\}$	$\{a, b\}$
C	$\{c\}$	$\{b\}$
D	$\{\epsilon, c\}$	$\{a, b\}$

Ex

$$\begin{aligned} S\# &\Rightarrow bT\# \Rightarrow bAb\# \\ &\Rightarrow basb\# \Rightarrow babTb\# \\ &\quad \downarrow \\ &\text{end character.} \end{aligned}$$

(2)

d) Construct an LL(1) Parse table for rewritten grammar.

	a	b	c	\$
S		bT		
T	Ab	Ba	Ab	
A	as		CB	
B		bD		
C		.	cD	
D	ϵ	ϵ	cD	

2] $\Sigma = \{u, v, w, x, y, z\}$

$S \rightarrow UVW$

$U \rightarrow u | wv | \epsilon$

$V \rightarrow w | xv | \epsilon$

$W \rightarrow y | z$

a) first and follow

3

	First	Follow
S	$\{u, y, z, w, x\}$	$\{\#\}$
U	$\{u, y, z, \epsilon\}$	$\{w, x, y, z\}$
V	$\{w, x, \epsilon\}$	$\{y, z\}$
W	$\{y, z\}$	$\{\#, v\}$
u		$\{w, x, y, z\}$
v		$\{w, x, y, z\}$
w		$\{y, z\}$
x		$\{u, y, z\}$
y		$\{\#, v\}$
z		$\{\#, v\}$

b) Parse table

	u	v	w	x	y	z	\$
S	uvw		uvw	uvw	uvw	uvw	
U	u		ϵ	ϵ	wv/ ϵ	wv/ ϵ	
V			w	xv	ϵ	ϵ	
W					y	z	

[3]

$S \rightarrow sab | c | dT | es | saT$

$T \rightarrow d | UV$

$V \rightarrow ab | \epsilon$

$V \rightarrow dVb$

* Construct LL(1) Parsing table for following grammar.

→ we cannot make LL(1) Parse table
since grammar is left recursive.

[4]